

## **ISS and Human Research Project Office Highlights April 30, 2010**

### **ISS Research Program**

#### **MDCA/FLEX on-orbit operations continue on ISS.**

On-orbit operations continued for the Multi-use Droplet Combustion Apparatus' Flame Extinguishment Experiment (MDCA/FLEX) this past week. The depleted methanol fuel reservoir was replaced with another methanol reservoir on April 26, 2010. The Molecular Sieve adsorber cartridge was replaced on April 27, 2010, with the Silica Gel adsorber cartridge. The Molecular Sieve adsorber was installed for use with the nitrogen test points. Now that the nitrogen test points are completed and the CO<sub>2</sub> test points are to begin, the Silica Gel adsorbers have been installed. Also installed on 27 April were two gas bottles. The bottle with 40% O<sub>2</sub> and 60% N<sub>2</sub> will be replaced with a bottle containing 40% O<sub>2</sub>, 20% CO<sub>2</sub>, and 40% N<sub>2</sub>. A second bottle with 100% CO<sub>2</sub> replaced a depleted 100% CO<sub>2</sub> bottle. Future test points are planned for May 2, 2010. (POC: J. Mark Hickman, (216) 977-7105)

#### **SAME-R holds Executive Systems Acceptance Review (SAR-2)**

The Smoke Aerosol Measurement Experiment-Reflight (SAME-R) team held its Executive Systems Acceptance Review on April 23, 2010. The SAR-2 Board approved the SAME-R hardware for shipment. The hardware shipped on April 25, 2010 and was turned over on April 26, 2010 to Kennedy Space Center (KSC) personnel. The Bench Review is scheduled for May 4, 2010 and ULF-4 is scheduled to launch on May 14, 2010. (POC: J. Mark Hickman, (216) 977-7105)

#### **CVB Journal Paper Published.**

An article, entitled "Constrained Vapor Bubble Experiment for International Space Station: Earth's Gravity Results", authored by Arya Chatterjee (Rensselaer Polytechnic Institute), Professors Joel L. Plawsky and Peter C. Wayner, Jr of RPI, DR. David F Chao(RET), Ronald J Sicker(MAH), Tibor Lorik(ZIN Tech), Louis Chestney(ZIN Tech), John Eustace(ZIN Tech), and John Zoldak(ZIN Tech), has been published in the Journal of Thermophysics and Heat Transfer Vol. 24, Number 2, April-June, 2010 issue. The Constrained Vapor Bubble (CVB) presently operating aboard the International Space Station promises to give us new insight into the fundamental science of interfacial thermophysics. The evaporating meniscus formed at the corner of the vapor bubble is expected to behave in a significantly different manner in the microgravity environment. Since the CVB can also be thought of as a micro heat pipe, it will also give technical understanding of the performance of a micro heat pipe in the space environment. Earth based experiments have been conducted for the past two decades to gain better knowledge of the rich phenomenon observed in the relatively simple CVB setup to provide a clearer picture of this complicated device. The article presents here some recent advancement made in understanding of the working of a CVB Heat Pipe based on ground-based experiments conducted at the NASA Glenn Research Center. These experiments form a template against which future results from space will be compared. Isothermal data agreed very well with existing theoretical predictions. Non-isothermal data also agreed well with the present understanding of the wickless heat pipe. Zones were identified and it was possible to locate the

different regions like evaporator and condenser regions of the heat pipe. (POC: RET/David F. Chao, (216) 433-8320, MAH/Ronald Sicker, (216) 433-6498).

### **DIME teams from Illinois and Ohio drop experiments in 2.2 Second Drop Tower**

The last two Dropping in a Microgravity Environment (DIME) teams were at GRC on April 23 and 22, 2010 to operate their experiments in the 2.2-Second Drop Tower. Jerry Myers/MAH and Bob Green/RET were the mentors for the team from Glenbrook North High School in Northbrook, IL and Jeff Mackey/ASRC was the mentor for the team from St. Ursula Academy in Toledo, OH. After a meet and greet, check-out of experiments and orientation of the 2.2-Second Drop Tower, the teams observed a NASA science drop and then began preparing their experiments for operations.

The Glenbrook team was investigating the charge distribution on electrostatically charged sand grains. The St. Ursula Academy team examined the molecular orientation of fluids under reduced gravity. In addition to the drops, the teams toured the Zero-Gravity Research Facility, the Icing Research Tunnel, and interviewed by the NASA Educational Technology Services (NETS) Project team. The teams will continue to analyze their results and then submit a final report to NASA on their experiment. For more info about DIME, see:

<http://microgravity.grc.nasa.gov/DIME.html> (POC: MAH/Nancy R. Hall (216) 433-5643)

### **Human Space Flight Explorer Post student astronauts return from simulated Mars mission.**

Post 633: The Human Space Flight Explorers Post afterschool program concluded their Mars Mission module and returned safely to Earth on April 27, 2010. This activity allowed students to become mission planners and Mars astronauts for seven weeks. Students filled out job applications for crew positions, learned about Mars trajectories and orbits to calculate their mission timeline. They established team identities by selecting names for their team, spacecraft and mission. They determined cargo needs and designed a Mars habitat. The two student teams selected sites near Arsia Mons and Centauri Montes based on scientific criteria. They learned about the microgravity environment during the long trip through space and developed experiments and activities to do during the voyage to Mars as well as on the surface based on their site selection. Following their return to Earth, students prepared press releases and presented briefings on their mission. The mission scenario was based on the NASA Mars Design Reference Architecture (DRA) 5.0. The mentors for this activity included Dawn Jenkins/Quinetiq, Thomas Miller/RPC, and W. Timothy Dedula/XN. (POC: MAH/Nancy Hall, (216)-433-5643)

### **Human Research Program**

#### **GRC HRP personnel attend innovation technology workshop.**

On April 21 and 22, MAH personnel attended an open innovation technology workshop sponsored by the Human Research Program's Exploration Medical Capabilities Element. Held at the Wright Brothers Institute in Dayton, OH, the discussions focused on obtaining innovative technology infusion via web-based technology challenge services, and utilizing university resources such as inter-school competitions and senior engineering capstone resources.

The Human Research Program intends to utilize all of these technology development techniques in the future to insure that the technology solution space is as thoroughly explored as possible.  
(POC: MAH/DeVon Griffen, (216) 433-8109)

**HRP personnel presents dental-related NASA spinoffs to Cleveland Free Clinic staff.**

On April 27, 2010, Dr. DeVon Griffen presented an overview of the Human Research Program and dental-related NASA spinoffs to the dental staff of the Cleveland Free Clinic. Counting both two question and answer sessions and the presentation itself, Dr. Griffen spoke for 2 hours.  
(POC: MAH/DeVon Griffen, (216) 433-8109)